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ABSTRACT

This report is a cross-linguistic study that compares the sequence of emergence of semantic relations in English with the sequence of emergence of these relations in the acquisition of American Sign Language. American Sign language (ASL) differs from English in modality (it is a visual-gesture language rather than an auditory-vocal one) and in the syntactic devices used for expressing many of the semantic relations examined in this study. While some semantic relations in adult ASL are produced very much as they are in English, others, most notably location, instrument, and dative, are signed by lexicalizing the verb and its arguments together. It is suggested that such syntactic differences between English and ASL could interact with semantic or conceptual complexity in determining the sequence in which relations are acquired by the child. The subjects are five deaf children of deaf parents who are learning ASL as their native language. It is found that the emergence of the semantic relations in a visual-gestural language is roughly the same as that in an auditory-vocal language, despite the striking differences of syntactic devices in the two model languages.
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THE EMERGENCE OF SEMANTIC RELATIONS IN ASL¹

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In the past few years, a number of investigators have begun to look at the types of meanings, or semantic relations, that children express in their earliest multi-word utterances (see Brown, 1973, for a review; and Braine, 1976; Feldman, Goldin-Meadow & Gleitman, in press; Goldin-Meadow, in press). The procedure for determining the semantic relations expressed by the child was introduced by Bloom (1970) and, in outline, is quite simple: one looks at the two-word utterance in conjunction with the non-linguistic context in which it is spoken, and thereby infers the meaningful relation between those words that the child intends to express. For example, if the child kicks a ball and then announces "Kick ball," one can hypothesize that he, in his primitive fashion, is expressing a relation of action, that is, an actor performing an action on an object. In the acquisition of English, as well as a variety of other spoken languages, the early relations expressed by children appear to be quite restricted (Bloom, 1970; Brown, 1973). Young children, in their earliest utterances, talk about such things as the existence and nonexistence of objects, actions on objects, and locations of objects. In general, then, it appears that the sorts of meanings that children encode in their earliest utterances are quite in line with the concepts they have about the world at this time (Bloom, 1973; Brown, 1973; Edwards, 1974).

It is of course conceivable that the precise sequence in which these relations appear in early speech is influenced in addition by the complexity of the syntactic devices the model language uses for expressing these relations (Slobin, 1973). Bloom, Lightbown and Hood (1975) have looked at the emergence of semantic relations in the acquisition of English. Across four children, they found that existence relations appeared in the earliest utterances. Over time, more complex verb relations began to appear. Within these verb relations, actions were talked about before transitory states. In addition, non-locational relations appeared before relations that expressed locations of objects in space. Finally, there was a set of relations that appeared quite late in two-word speech. These included datives (the transfer of objects between persons), actions with instruments, intentions, and causation of actions.

We would like to report a cross-linguistic study, in which we have compared this sequence of emergence of semantic relations in English with the sequence of emergence of these relations in the acquisition of American Sign Language.

American Sign Language (ASL, or Sign) is the language used by the deaf community in the United States. It differs from English (and other spoken languages), first, in modality: it is a visual-gestural language rather than an auditory-vocal language. Second, it differs radically from English in the syntactic devices used for expressing many of the semantic relations of interest here.

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Some semantic relations in adult ASL are produced very much as they are in English. That is, one sign is produced for each of the arguments in a relation, and the order in which such arguments are signed determines the roles which the arguments take (Fischer, 1974; Liddell, 1977). For example, one can express an action relation by first producing a sign for the actor, then a sign for the action, and then for the object: BOY HIT GIRL.² For many relations, however, signs are not produced individually for each of the arguments. Instead, the movement or handshape of the verb itself may incorporate or include its arguments (Bellugi & Fischer, 1972; Fischer & Gough, 1973). In this case, it is not sign order which determines the roles taken by the arguments. For example, instruments are often signed as part of the action verb itself. The sign CUT-WITH-SCISSORS is made with the handshape of scissors, while the sign CUT-WITH-KNIFE is made with the handshape for a long, thin, flat object. One can also incorporate persons, locations, or objects in the movement of the verb. For example, "He gave it to her" is produced in a single sign (GIVE) which moves from the location³ of the actor to the location of the recipient: HE-GIVE-HER. "He put it on the table" is produced in two signs, with the sign for the verb PUT moving toward the location of the goal (i.e., the table): HE PUT-ON-TABLE.

In short, some semantic relations in ASL, most notably location, instrument, and dative, are signed by lexicalizing the verb and its arguments together. If the young child has difficulties in producing utterances which include many independent, sequential parts, or if he has difficulties in learning how his model language expresses such relations, these difficulties might be eased in the learning of certain relations in ASL. In other words, it might be possible that such syntactic differences between English and ASL could interact with semantic or conceptual complexity in determining the sequence in which relations are acquired by the child.

Our subjects were five deaf children of deaf parents who are learning American Sign Language rather than English as their native language. These children were videotaped for one to two hours at roughly one-month intervals, both in Dr. Ursula Bellugi's laboratory at the Salk Institute and in their homes. The tapes were transcribed by a deaf native signer. We then viewed the videotapes, along with these transcriptions, and coded all multi-sign (and multi-morpheme) utterances for semantic relations, using the coding scheme developed by Bloom et al. (1975).

Table 1 defines the relations we will concentrate on here, namely, existence, action, location, state, and a set of verb relations which emerged late in the acquisition of English, including datives, instruments, and intentions.

Tables 2 and 3 present the proportion of all relations falling into these categories. There were a large number of interviews for each of these subjects (3 to 10 videotaped sessions per subject during the period under discussion). For ease of presentation we have collapsed the total set of interviews for each subject into thirds: Column I represents

Table 1 - Semantic Categories

Existence:	pointing out and naming an object, e.g., THAT BALL
Action:	action performed by an actor, e.g., EAT SANDWICH; OWL FLY
Location:	either (1) action involving movement of an object from one location to another, e.g., PICK-UP PENCIL or (2) static location of an object, e.g., DOG OUTSIDE
State:	transitory state, e.g., CHAIR BROKEN
Late relations	
Dative:	action involving movement of an object from one person to another, e.g., GIVE BOOK
Instrument:	action performed with an instrument, e.g., KNIFE CUT
Action-place:	action performed at a location, e.g., PLAY OUTSIDE
Matrix:	cause, intention, or manner of action, e.g., HOW OPEN?

Table 2 - Proportion of Existence Relation

	I	II	III
Subject 1	.41		
2	.80	.43	.20
3	.32	.45	.24
4	.23	.16	.09
5	.21	.11	.17
Mean	.39	.29	.18

Table 3 - Proportions of Verb Relations

Subject 1				Subject 2			
	I				I	II	III
ACTION	.21			ACTION	.00	.11	.23
STATE	.10			STATE	.00	.12	.12
LOCATION	.07			LOCATION	.00	.06	.12
LATE	.00			LATE	.00	.02	.04
Subject 3				Subject 4			
	I	II	III		I	II	III
ACTION	.19	.14	.18	ACTION	.10	.09	.09
STATE	.18	.05	.11	STATE	.12	.16	.19
LOCATION	.02	.04	.09	LOCATION	.09	.13	.13
LATE	.00	.01	.02	LATE	.04	.03	.06
Subject 5							
	I	II	III				
ACTION	.16	.19	.17				
STATE	.14	.17	.12				
LOCATION	.11	.08	.14				
LATE	.05	.13	.06				

the first third, II the second third, etc. Subject #1 is the only exception to this method of presentation. Subject #1 was our youngest subject (16 to 22 months of age during our study). He produced very few utterances throughout the study; we have therefore collapsed all of his multi-sign utterances under Column I. The subjects are numbered roughly according to their ages at the earliest interview. Subject #1, as we have said, was filmed from 16-22 months of age. Subject #2 was filmed from 17-30 months. Subjects #3, #4, and #5 ranged from 2½ to 3½ years.

Table 2 presents the proportion of all relations accounted for by existence, or naming (that is, pointing at an object and signing its name). For all subjects, the proportion of existence relations was high at the earliest interviews and declined with development. This corresponds to the findings of Bloom et al. (1975) for children acquiring English.

Table 3 presents the proportions of selected verb relations. For each of the subjects, verb relations at the earliest interviews were less frequent than existence relations. This was particularly pronounced in the youngest subjects, #1 and #2. In addition, the relations which emerged late in the acquisition of English likewise appeared late and relatively infrequently in the acquisition of ASL.

Since the data in Tables 2 and 3 are collapsed across several sessions, it is not possible to determine by inspecting the tables the precise sequence in which the individual relations became productive in early signing. In order to determine the sequence in which these relations emerged, we applied a number of different productivity criteria: (1) when the child first produced more than three utterances expressing the relation; (2) when the child first used more than one verb expressing the relation; and (3) when the proportion of utterances expressing the relation first rose above 5%. We then looked at the sequence in which the relations in question achieved these productivity criteria. In fact, the sequence of emergence of the relations was approximately the same on any of these criteria.

The results indicated that, for children acquiring American Sign Language, the sequence in which these semantic relations emerged was approximately the same as that for children learning English, despite the difference in the modality of the languages and the consequent differences in the syntactic means of expression in the two languages. Subjects #1 and #2, our youngest subjects, used only the existence relations productively at the earliest interviews. Action, and then state, appeared later. All of these relations were productive from the earliest interviews in the older subjects. Location relations then became productive in Subjects #2 and #3. These were likewise productive from the earliest interviews in Subjects #4 and #5. In short, existence relations appeared before action relations, action preceded state, and nonlocative relations preceded locative relations. In addition, those same verb relations which appear very late in English also appeared late in sign. Dative, instrument, etc., did not appear at all in Subject #1 or in the

earliest interviews of Subjects #2 and #3. They became productive, if ever, only in the later interviews of the oldest subjects.

We have said that some of these semantic relations are produced in adult ASL by signing the verb and its arguments all within one lexical item. It may therefore seem possible that we have simply omitted such relations from our data by choosing to look only at multi-sign utterances. In fact, we have examined all of the single sign utterances as well and have found that young children seem not to make use of the incorporative syntactic devices which are used in the adult Sign. Rather, in the earliest stages of signing, they tend to express relations by producing a separate sign for each argument rather than by incorporating the arguments into the movement or handshape of the verb (see also Fischer, 1973). In addition, like in English and many other spoken languages, ordering is a predominant device for early syntactic expression. For example, the dative relation "He gave it to her" will not be signed in the adult form HE-GIVE-HER, with the sign GIVE moving from actor to recipient. Rather, it will be signed by the young child as HE GIVE HER, with each of the arguments represented in an explicit sign and in a fixed order. In short, the young child seems not to make use of the syntactic devices particular to American Sign Language.

In sum, we have found that the emergence of these semantic relations in a visual-gestural language is roughly the same as that in an auditory-vocal language, despite striking differences of syntactic devices in the two model languages. Thus we can conclude that such syntactic differences have little influence on the expression of these basic semantic relations in the early language of the child.

Footnotes

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The present paper is intended only as a working report. A full report of the analyses and data is forthcoming.

² We represent signs by an English gloss in capital letters. Where more than one English word is required to gloss a sign, the words are connected by hyphens.

³ The locations of persons or objects incorporated into the movement of the verb are either (1) the real locations of persons or objects present in the physical space surrounding the signer, or (2) the locations previously established in the signing space for absent persons or objects.

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COMPREHENSION STRATEGIES IN TWO AND THREE-YEAR-OLDS:
ANIMATE AGENTS OR PROBABLE EVENTS?

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English-speaking children are typically 3 1/2 to 5 years old before they consistently use word order as a cue to meaning in active, semantically reversible sentences such as The boy washes the girl and The girl washes the boy (Fraser, Bellugi, and Brown, 1963; Carrow, 1968; Owings, 1972; de Villiers and de Villiers, 1973; Strohner and Nelson, 1974; Chapman and Miller, 1975).

One question raised by this finding is that of how English-speaking children understand simple sentences prior to their use of word order cues. In ordinary conversation, ongoing activity may make agent and object-of-action clear for much of what is said. Such context is not available, however, in experimental comprehension tasks. Group performances on these experimental tasks suggest the existence of the following response preferences:

- 1) Child as agent (Sinclair and Bronckart, 1972; de Villiers and de Villiers, 1973), in which the child himself acts on one or both objects in the way mentioned. This response is frequent among children in Brown's (1973) early Stage I.
- 2) Probable even (Bever, 1970; Strohner and Nelson, 1974), in which the more probable agent and object relation is preferred.
- 3) Animate noun as agent (Chapman and Miller, 1975), in which the animate noun in the sentence is more often acted out as the agent than the inanimate noun.
- 4) Relative object size, in which a preferred size determines the toy used as agent. This bias was an alternative explanation to the animate agent preference in the Chapman and Miller (1975) study, since the smaller toy was always the animate one.
- 5) Position bias, in which the picture or object in a preferred position is chosen. This factor has traditionally been one for control.
- 6) Word order, in which the first noun mentioned in a sentence is preferred as agent (Bever, 1970). At about the same time, group performance on reversible passives drops below chance, suggesting an over-extension of a word order - based preference to passives (Bever, 1970; Owings, 1972; de Villiers and de Villiers, 1973; Maratsos, 1974; Beilin, 1975; Horgan, 1975; Maratsos and Abramovitch, 1975).

One can call these preferences comprehension strategies if individual children show them consistently (for example, at least 80% of the time) in